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### MESSAGES:

- Warming will be accompanied by decreases in demand for heating energy and increases in demand for cooling energy. The latter will result in significant increases in electricity use and peak demand in most regions.
- Energy production is likely to be constrained by rising temperatures and limited water supplies in many regions.
- Energy production and delivery systems are exposed to sea-level rise and extreme weather events in vulnerable regions.
- Climate change is likely to affect some renewable energy sources across the nation, such as hydropower production in regions subject to changing patterns of precipitation or snowmelt.

### Significant Weather-Related U.S. Electric Grid Disturbances

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Energy is at the heart of the global warming challenge. It is humanity's production and use of energy that is the primary cause of global warming, and in turn, climate change will eventually affect our production and use of energy. The vast majority of U.S. greenhouse gas emissions, about 87 percent, come from energy production and use.

At the same time, other U.S. trends are increasing energy use: population shifts to the South, especially the Southwest, where air conditioning use is high, an increase in the square footage built per person, increased electrification of the residential and commercial sectors, and increased market penetration of air conditioning.

Many of the effects of climate change on energy production and use in the United States are not well studied. Some of the effects of climate change, however, have clear implications for energy production and use. For instance, rising temperatures are expected to increase energy requirements for cooling and reduce energy requirements for heating. Changes in precipitation have the potential to affect prospects for hydropower, positively or negatively. Increases in hurricane intensity are likely to cause further disruptions to oil and gas operations in the Gulf, like those experienced in 2005 with Hurricane Katrina and in 2008 with Hurricane Ike. Concerns about climate change impacts will almost certainly alter perceptions and valuations of energy technology alternatives. These effects are very likely to be relevant for energy policies, decisions, and institutions in the United States, affecting courses of action and appropriate strategies for risk management.

The overall scale of the national energy economy is very large, and the energy industry has both the financial and the managerial resources to be adaptive. Impacts due to climate change are likely to be most apparent at sub-national scales, such as regional effects of extreme weather events and reduced water availability, and effects of increased cooling demands on especially vulnerable places and populations.